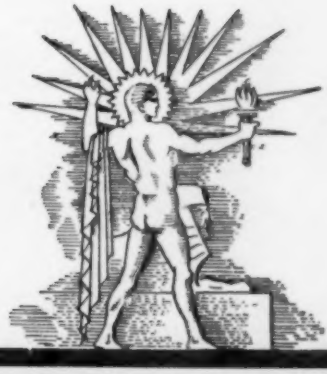
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



DECEMBER 19, 1931

Santa Claus Cavalry

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The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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? DO YOU KNOW THAT ?

Helium 99.96 per cent. pure has been produced in a government laboratory in Texas, an important advance, since increased purity of helium gives increased lifting power to airships.

Central Asia is becoming more and more arid, and the Gobi Desert is advancing steadily into northern China.

Cottonseed flour is gaining in importance as food, due to the fact that it contains vitamin B and G and other nutritive substances at relatively low price.

There is no modern dictionary or encyclopedia of mathematics in the English language.

The biggest frogs in the world are the Goliath frogs, whose bodies are about 12 inches long, exclusive of their powerful limbs.

Artichokes are produced commercially in the United States only in the fog belt along the California coast.

One reason for the rat's usefulness in scientific experiments is that a week in a rat's life is about equal to a year in the life cycle of a human being.

A sunflower plant requires about a quart of water a day, whereas a beech tree may need to drink as much as 80 quarts in the same time.

With all the advances made in fighting tuberculosis, this disease still takes more lives between the ages of 15 and 45 years than any other disease.

Garnets are generally associated with the color red, but these stones occur in almost every color except blue.

In ancient Egypt, the title "White House" was bestowed not upon the residence of the ruler but upon the treasury.

Rickets rarely develops in children earlier than the third month of life, and has usually done its work by the eighteenth month.

WITH THE SCIENCES THIS WEEK

Science Service presents over the radio, an address

CHRISTMAS TREES

By H. N. Wheeler, Chief Lecturer, U. S. Forest Service.

Friday, December 25, at 3:45 P. M., Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

CHEMISTRY

Hydrogen Atoms of Twice Usual Weight are Discovered

New Building Block of Matter, Separated by Evaporating Liquid Hydrogen, May Clear Up Mystery of Atom Core

HYDROGEN atoms twice as heavy as usual, forming probably a new unit in the building of all other chemical atoms and throwing new light on the mystery of the atom core, have been detected for a first time through the collaboration of Prof. Harold C. Urey and Dr. G. M. Murphy of Columbia University with Dr. F. G. Brickwedde of the U. S. Bureau of Standards.

The low temperature laboratory of the Bureau, in which liquid helium was made for the first time in the United States some months ago by Dr. Brickwedde and others, assisted in the discovery of this new hydrogen isotope, which differs from ordinary hydrogen only in the weight of its atoms. By evaporating liquid hydrogen under a reduced pressure, and at the excessively low temperature of freezing hydrogen 434 degrees below zero Fahrenheit, a partial separation of the heavier atoms was achieved. Prof. Urey and Dr. Murphy then examined the heavier distillate in their spectroscope in New York and found a new series of "Balmer" lines that could only be attributed to hydrogen atoms of atomic weight two. Only one atom out of four thousand in ordinary hydrogen gas, however, he finds, is of the new H_2 kind.

Isotope Predicted

Prof. Urey himself had predicted May last that this hydrogen isotope of weight two would be found. His conclusion was drawn from a consideration of the relations between the numbers of electrons and protons in the known atomic nuclei. Independently Prof. Herrick L. Johnson of Ohio State University and Prof. Raymond T. Birge and D. H. Menzel of the University of California had made the same prediction. Dr. Johnson followed practically the same reasoning as Prof. Urey, while Prof. Birge reached his conclusion by comparing chemical atomic weights and isotopic weights obtained direct by Dr. F. W. Aston in Cambridge, England.

Fairness of the spectrum or rainbow of the light emitted by the heavier hydrogen prevented previous seekers from observing the tell-tale lines, Prof. Urey believes. Prof. Urey did indeed observe these lines in the spectrum of ordinary hydrogen gas but they were so faint that he could not be sure they were not "ghost" lines caused by irregularities in the apparatus used for detecting them. When in the low temperature experiments the proportion of the rare isotope was raised to 1 in 800, however, the H_2 lines became visible near the regular lines of the "Balmer" spectrum. The nucleus of the new atom lies in weight between ordinary hydrogen, weight one, and helium, weight four, both of them regarded as the units of which the cores of all other atoms are made. The new H_2 provides a new building block for atom nuclei, believes Dr. Brickwedde, and will be investigated with great eagerness by both chemists and physicists for the light it will throw on the structure of the nucleus.

The outside coatings of the new hydrogen atoms are identical in all respects, including chemical properties, with ordinary hydrogens. Only the mass of the nucleus is different. These two forms are not to be confused, however, with the symmetric para and unsymmetric ortho hydrogen atoms discovered in 1929 by Drs. K. F. Bonhoeffer, and P. Harteck at the Kaiser Wilhelm Institute for Physical Chemistry in Berlin. These forms of hydrogen were of equal weight but different magnetic properties.

A new still will be made at the Bureau of Standards, which Dr. Brickwedde will use to attempt a more complete separation of the hydrogen twins. As the one is twice as heavy as the other he believes that this should be quite possible.

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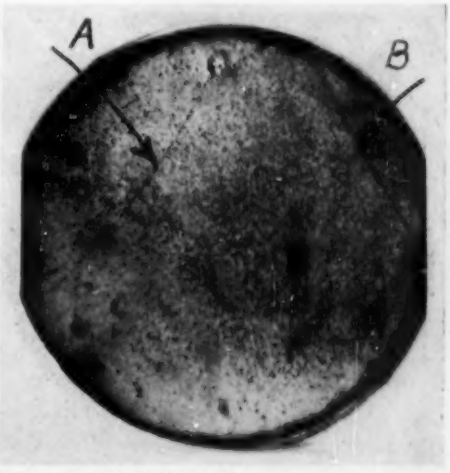
MEDICINE

Growth-Checking Extract Used in Cancer Treatment

A SUBSTANCE having remarkable powers of controlling the growth of living beings and of possible value in the treatment of cancer is being investigated in the laboratories of the Royal College of Surgeons of England and at King's College. The discovery is due to a young biochemist, J. H. Thompson, who has found that an extract of the parathyroid gland of cattle will restrict or prevent growth without endangering the health of the organism.



COSMIC RAYS DISRUPT ATOMIC HEARTS

When atomic hearts are broken by cosmic rays from interstellar space, there are formed high speed particles of electricity and matter that have been photographed by Dr. Carl D. Anderson, above, of the California Institute of Technology at Pasadena. (S. N. L., Dec. 12, 1931.) The curving track "a" is an electron of 140,000,000 volts energy. Track "b" is a positively charged particle, probably a proton, of about 70,000,000 volts energy. The curve in the tracks is produced by the influence of a powerful magnetic field of 17,000 gauss, and the tracks can be seen because they are trains of water droplets condensed in an artificial cloud by the passage of the rays from the smashed atoms. Dr. Anderson discovered the disrupting effect of cosmic rays upon atomic nuclei during research in collaboration with Dr. Robert A. Millikan.

The most important application of this discovery lies in the treatment of cancer. It is being tested in several London hospitals with very encouraging results. Sir Arthur Keith has further suggested that it may be of value in the treatment of acromegaly or gigantism, which is due to abnormal functioning of the pituitary gland.

The effect of the extract was first observed on rats and rabbits, then on water cress. At the suggestion of Prof. Julian S. Huxley it was tried on the axolotl, a form of salamander. In all these cases the growth-retarding effect has been very marked. Treated rabbits have remained at about half the size of their untreated brothers and sisters. The germination of water cress seeds is entirely stopped by a 20 per cent. solution of the extract.

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BOTANY

Cheesecloth Saving Rare Plant On Rim of Hawaiian Volcano

ONE OF THE MOST interesting plants in the world, the Haleakala Silversword, once abundant in its limited area, has now become so scarce that botanists of the U. S. National Park Service cover every specimen of it that comes into bloom with cheesecloth to protect it from insect enemies that would otherwise destroy its seeds.

The Haleakala Silversword, as its name implies, grows only on the rim and in the crater of Haleakala, a great dormant volcano in that portion of the Hawaii National Park located on the island of Maui, one of the Hawaiian Islands. It belongs to the great Composite family of plants.

Beautiful Silvery Sphere

When young the plant, known to Hawaiians as "pohinahina" or "ahinahina" from their word for "gray," is a beautiful silvery sphere of incurved linear leaves. The silvery coloring is caused by the dense covering of hair which repels some of the penetrating rays of the sun and also guards the plants from too rapid loss of moisture. When it attains a diameter of about two feet, the great silvery ball shoots up a magnificent cluster of flowering heads to a height of from three to six feet.

Probably the very abundance of the silversword not so many years ago is the main cause of its scarcity now. Before the area was made a national park no effort was made to conserve a plant which grew in such profusion. So the silver balls were pulled and sent rolling down the rim to present a spectacle something resembling the rolling of giant snowballs, or they were ruthlessly gathered for shipment to the Orient for use as ornaments.

According to Otto Degener, botanist of the Hawaii National Park, in one place where a garden of silversword ten acres in extent grew in the nineties of the last century, not one plant could be found 30 years later.

The silversword generally flowers but once, dying after the maturing of its fruit. It is therefore important that the blossoms be protected, to give the seeds a chance to mature. Perhaps the worst enemy the plants have, now that the National Park Service is protecting them from the vandalism of man, is the tyrpetid fly, which lays its eggs in the seed pods. The larvae, maturing, feed upon the seeds.

So the Park Service is extending its care of the plants, now wrapping their blooms in cheescloth to give them a chance to mature.

The silversword chose a fitting habitat when it selected Haleakala, one of the largest dormant volancoes in the world and known to have erupted less than two hundred years ago. In its great crater, with an area of nineteen square miles, could be placed an entire city.

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HALEAKALA'S SILVERSWORD

ENGINEERING

Test Auto Measures Power Output While in Motion

A UNIQUE gasoline-electric automobile for measuring whether one kind of highway requires more power of a vehicle than another is being tested at the Iowa Engineering Experiment Station at Ames, Raymond G. Paustian, Jr., engineer, has reported to the Highway Research Board of the National Research Council.

The vehicle is a remodeled automobile of a standard make. The transmission was stripped out and in its place an electric generator and a motor were installed, Mr. Paustian said. The gasoline motor drives the generator, which drives the motor, which in turn runs the car. Since power to the wheels comes directly from the electric motor, it can be measured by metering the electrical input to the motor. Losses in the motor and in the transmission of power through the differential to the rear wheels are accounted for by a laboratory calibration on a drum dynamometer.

Power measurements are now being made on level concrete roads, Mr. Paustian explained, in order to perfect the operation of the car. Instruments are read not by making notations with pencil and pad but by taking photographs of the faces of the meters. With a motion picture camera readings can be taken exactly at ten-foot intervals even though the car is traveling sixty miles an hour.

"During the coming year a series of extensive investigations with this equipment will be undertaken," Mr. Paustian said. "Measurement of the resistance of concrete, brick, gravel, earth and other roadway surfaces at low and high vehicle speeds is the problem of primary interest. A measurement of the power requirements of highway grades will also be undertaken and will be correlated with a study of gasoline consumption when the car travels over different grades on various types of roadway surfaces."

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PSYCHOLOGY

Boys Demonstrate Ability To See Things Hidden by Screen

Power to Retain Mental Pictures Which are More Than Memory Images May Exist to Some Extent in All Children

IF THE ordinary adult were able to see an object before his eyes after he knew it had been taken away, he would probably be quite alarmed. "Seeing things" is considered quite abnormal among grown-ups.

Many children, however, are able to do just this, and several boys from St. Mary's Industrial School in Baltimore, Md., demonstrated this ability before the psychology class of Dr. J. Edward Rauth at Trinity College, Washington.

The boys were allowed to look at a colored picture for a few seconds—a time entirely too short for them to memorize the details—and then after it was withdrawn they would describe what they saw upon a gray screen. They could answer any questions about the picture, even to counting the buttons on the coat of a man illustrated, until after a few minutes the image would fade.

An even more interesting demonstration of the ability made use of a form board containing holes shaped like triangles, stars and other geometric forms with blocks to fit these holes. The child was allowed to look at the board for a few seconds. Then a screen was held over the board so that he could not see it. The child would pick up a block and would look up and down the blank screen, evidently searching his image of the board for the right hole. When he was satisfied, he would reach under the screen and without the slightest hesitation place the block in its place in the hidden board.

Power Fades At 16

Dr. Rauth believes this ability in children to be much more common than psychologists have realized. It is possible that all children have it to some extent. It exists to a measurable extent in fully half the 250 boys that Dr. Rauth has tested. But the power seems to fade at about the age of 16. The few adults who retain it are usually found among artists, sculptors, and musicians, Dr. Rauth told his class.

The children who have the ability, termed eidetic imagery, are also able to produce from memory pictures which are more than memory images.

The eidetic child is able to distinguish between these images and his memory pictures. He will say of the memory that it is "in my head." But the projected eidetic image is "right there" where he points.

And the images are not necessarily visual. One boy was asked to count with the beats of a metronome and to stop when it stopped. He counted four counts beyond the beating of the metronome, and was not aware that it had stopped.

When one boy was asked to make believe that he was tasting something very sour, the taste was so real to him that he was able to put his finger on the exact spot on his tongue where the sour was. This spot was exactly where the taste buds are most sensitive to sour.

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MEDICINE

Warning Against New Baldness "Cures" Issued

WARNING that a new crop of baldness "cures," though not necessarily any new crops of hair, may be expected shortly is seen in the note received by the American Medical Association from the proponent of the latest method of growing hair on bald heads, Dr. Bengt Norman Bengtson of the University of Illinois School of Medicine.

Dr. Bengtson recently reported striking results in treating baldness with a pituitary gland preparation.

Now it appears the baldness "cure" manufacturers are ready to cash in on the new method without waiting for further scientific confirmation of its value. The situation is not without danger, since pituitary gland extracts are extremely potent substances that cannot be safely used without medical advice.

Charlatans Active

Since his preliminary report, Dr. Bengtson has been besieged with thousands of letters. Commenting on these, he said:

"The experiments, while gratifying in certain types of baldness, do not indicate that a complete solution to this age-old problem has been realized.

"Several non-medical organizations, presumably interested only from a commercial point of view have already attempted to obtain material for promulgation to the public, and several charlatans have stated that they were personally associated with me and therefore absolutely competent to administer the method.

"I have had no associates and no one is authorized to speak for the experimental clinic which is being conducted by the research department of the University of Illinois School of Medicine.

"While interesting, the results have not yet been such as to warrant extreme optimism. Only after extensive and exhaustive research will it be possible to say to what extent the method is specific."

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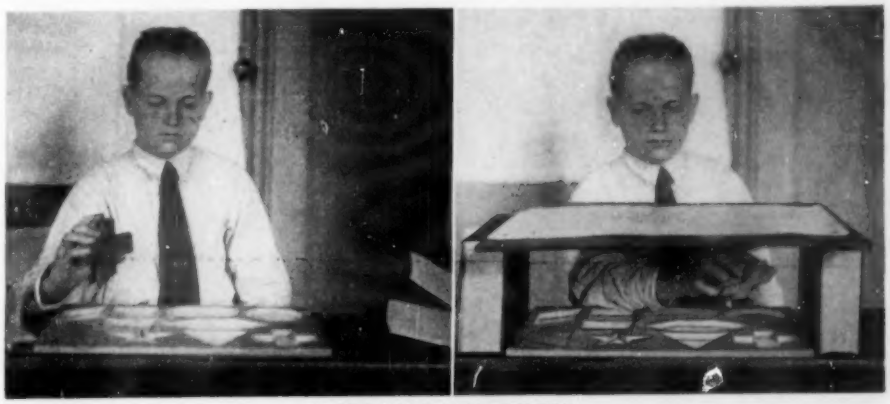


A STRANGE FACULTY

Seeing an image of the puzzle board on the gray screen used to hide the board, the boy, at right, searches his image and places each block in its proper hole. Left, the boy shows how the puzzle board is ordinarily used in mental testing.

PSYCHOLOGY

The Stuff That Dreams Are Made Of

New Theory, Differing From Freud's, Holds That a Dream Is the Mind's Misreading of Signals From the Body

By Marjorie Van de Water

HAVE YOU ever had the strange dream of floating or flying through the air? Or the embarrassing one of walking through the midst of a dignified assemblage while you are completely devoid of the garments which custom regards as essential? If you have, you have undoubtedly looked for an explanation of these experiences of sleep.

The riddle of what produces dreams is one that appeals to the curiosity of nearly everyone. It has a more serious interest for those who are seeking the clue to what causes the waking dreams or phantasies of those unfortunate persons who suffer from mental disorders.

Dr. Lydiard H. Horton, of the Evans Memorial for Clinical Research and Preventive Medicine, in Boston, Mass., has for many years been engaged in the study of dreams and hallucinations of normal and abnormal persons. He now offers a new explanation of why these odd pictures and fancied experiences are conjured up. Dr. Horton presented his ideas before the American Psychopathological Association.

A dream picture is brought before the sleeper, he tells us, in much the same manner as a vivid memory of some past event may be brought to mind by just a whiff of the scent of some particular flower. The sleeper perhaps feels the weight of a heavy blanket pressing on his toe. Or he becomes slightly chilled because of the absence of that blanket. Or he hears an unusual sound. Or he is besieged by one or any number of possible sensations caused by the activity within his own body.

The dream is then read between the lines of these sensations through what Dr. Horton calls "apperceptive errors." Apperception is the psychological term denoting the mental interpretation of what a person observes.

For instance, the lookout on the warship sees, or perceives, a dark object of a certain size and shape on the surface of the water. His apperception is what he immediately adds to his perception that tells him that there is a submarine. In case the periscope is a false one or one cleverly camouflaged he will make an apperceptive error and see a submarine where none exists.

As an illustration of apperceptive errors in a waking person Dr. Horton tells the story of a man visiting in the country who heard a shrill, metallic sound. He was sitting out of doors with his host and hostess and his back was turned to the source of the sound.

Hit and Miss

"Are you enough of a countryman to recognize that sound?" the hostess wanted to know.

"I hear the shrill tone of cart wheels grinding in the snow on a very cold day," the guest replied, mentioning the first thing that came into his mind.

"How silly!" said the host; rightly, for it was a warm summer afternoon.

"Try again," said the amused hostess. "The farmer is sharpening a scythe with his stone."

"Try again," she urged.

"Someone milking a cow is directing a thin stream against the side of a tin pail."

"Correct," said the hostess.

This gradual improvement of the image to correspond more and more closely to what is actually occurring is characteristic also of dreams.

Such an apperceptive error is made by the sleeper who dreams he is climbing stairs. What actually happens may be that he feels a slight chill. The body automatically responds to chilling by a process designed to restore the correct temperature. That is, the heart rate is speeded somewhat, breathing is more rapid, the hair of the body is raised in gooseflesh, the blood vessels are dilated, and various changes occur in the secretion of the adrenal glands.

The thumping heart may send its signal through to the sleep-fogged brain, and is there interpreted not at its face value but as a repetition of the remembered slightly breathless experience of running up stairs. The reason why this particular action appears in the dream is that it is so closely associated with that particular bodily feeling caused by rapid heart and breathing.

Now the sleeper becomes more aware of certain other sensations, including the gooseflesh. The stairway fades and he sees himself as being afraid. He is running away from a vague mysterious something which threatens him. He is involved in a "hair-raising" adventure.

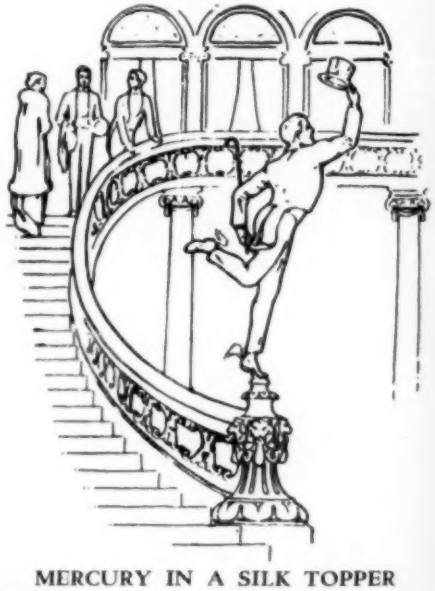
By this time the mechanism of the body, which works so well without any direction on our part, has completed its task. The slight chill is replaced by the cozy warmth which automatically follows such a stimulation of the circulation.

Now the spectre vanishes and the runner pictures himself as entering a beautiful garden where the sun casts its warm rays on bright flowers.

Thus are dreams built around sensations according to Dr. Horton.

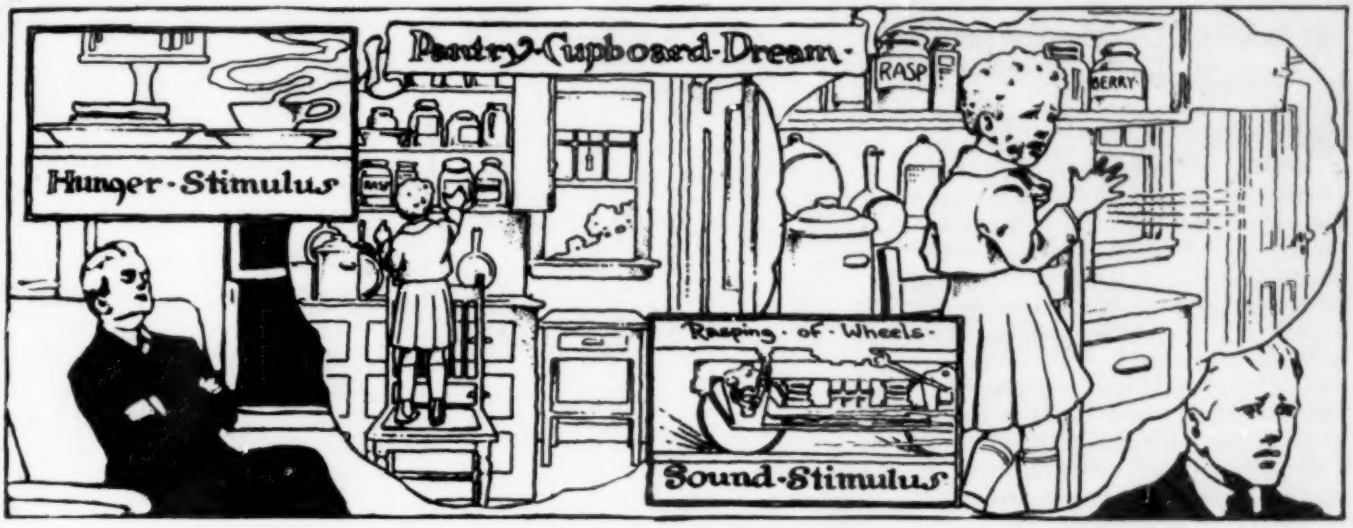
The dream of a staircase is a natural response to a fast-beating heart, he tells us. He believes there is no need to explain it as a symbol of some subconscious thought or wish, as Freud has taught. Neither does it show, as the old-fashioned "dream book" would indicate, that you have an aspiring disposition, but merely that a lowered skin temperature has speeded up your physiological processes.

The dream of floating, of flying either



MERCURY IN A SILK TOPPER

Sometimes ideas are telescoped together in dreams. A chill which probably conjured up the picture of the Winged Mercury statue was immediately followed by the glow of warming up so that the lack of clothing idea was merged with the idea of plenty of clothes. Pressure of a heavy blanket on the toes had its share in making the dreamer see himself as standing on tip-toe.



EXPLAINING WHAT HAPPENED

A train traveller feeling hungry, began to doze. Simultaneously he heard the screech of the train wheels as the car went around a curve. The brain got the two signals mixed: hunger made the traveller dream he was a child robbing the jam closet, and the noise of the wheels made him dream that a sudden scream interrupted him.

without natural means or in an airship or plane, of going about the world on a magic carpet, or of having the soul leave the body, is due also to physiological changes involved in the regulation of temperature. The dilation of the blood vessels have their own part in this process. In this interpretation Dr. Horton again differs with Freud, who believes them to be symbolic representations of unconscious sex desires.

To find the correct interpretation of this dream is a matter of more than abstract scientific interest. It is one of practical importance to psychiatrists and psychologists who deal with mental ills, for this dream occurs not uncommonly as an illusion or delusion in persons who are seemingly wide-awake.

Out of 105 cases whom Dr. Horton observed in connection with exercises in relaxation previous to inducing sleep or near-sleep, eighteen revealed peculiar floating sensations which brought to their minds various levitation phantasies.

Nevertheless, although the feeling may seem real enough to us, only a very few actually seriously believe in an ability to spread their arms and fly away. Insane persons may.

Such a delusion, Dr. Horton believes, is due to a misrepresentation of physical sensation set up by the automatic mechanism of the body—that which controls the blood circulation, perspiration regulation, hair raising, and so on.

All this involuntary part of our life, is tied up with the sympathetic nervous system directed by that part of the brain known as the thalamus, or 'tween brain.

Dr. W. B. Cannon, the eminent Harvard physiologist whose researches corroborate Dr. Horton's theory as to the nature of dreams of flying, has found another function of the thalamus. His experiments indicate that it is the active center of the emotions. When you are under the influence of a strong emotion like that of intense fear, important changes immediately take place in your body. Your rate of breathing is increased. Your pulse rate becomes more rapid. Your digestive processes slow up or stop. Your adrenal glands pour out their secretion of the powerful adrenin. Sugar is added in the blood stream. All this takes place under the direction of the thalamus.

Cold Does It, Too

But fear is not the only activating force that will start this train of events. Anger will do it, too. With no emotional cause at all, exposure to cold will do it. Or fever. Or a dose of adrenin.

It is for this reason that the sleeper is reminded by his physiological sensations of a scene in which he is fearful or angry. The signals from the thalamus to the thinking brain become mixed just as over the radio the cooking lesson sometimes comes in set to jazz.

The sleeper in one of the dreams studied by Dr. Horton heard the screech of the wheel of a railroad train going around a curve. At the same time he was receiving the signals of hunger from his stomach. The result was a dream in which he saw himself as a small boy stealing jam from a closet and heard a scream. In the dream, the boy was terrified by the shriek which awoke the sleeper. Actually, however, as dreamer, he felt no emotion whatever, and on awakening was greatly surprised that he should feel so calm about the alarm dramatized in the dream.

The telescoping of two ideas into one is another feature of dreams. This occurs after the fashion of portmanteau words made famous by Lewis Carroll's "Hunting of the Snark." For example, one dreamer pictured himself as poised on the newel post at the foot of a stairway in the attitude of the Flying Mercury statue. Far from being scantily clad, however, this gentleman was attired in full evening dress and held in his upstretched hand a high silk hat. Here the idea of lack of clothing associated with the Mercury figure was telescoped with the idea of plenty of clothing, because the warming up of the body, after the chill, occurred with great rapidity. The attitude of the figure, balancing on one toe, resulted from the pressure of a heavy blanket on that toe.

In brief, Dr. Horton's theory is that dreams are to be interpreted as a misreading by the thinking brain of the various signals communicated to it. The signals come from the ordinary avenues of the senses, and, more often than now supposed, the internal sensations of the bodily organs themselves, due to the action of that switchboard of the sympathetic nervous system, the thalamus, which is situated in the basal portion of the brain.

ASTROPHYSICS

Mechanical Device Notes Changes in Sun's Activity

A "BRASS BRAIN," that ferrets out cyclic variations in the amount of heat and light put forth by the sun, was demonstrated by Dr. Charles G. Abbot, secretary of the Smithsonian Institution, at the meeting of his board of regents. It consists of a simple but ingenious arrangement of sliding brass pins on two wheels, which will automatically untangle a curve representing one period of activity from a compound curve in which more than one such period may be indicated.

The device is intended for use in Dr. Abbot's study of the fluctuations in the amount of energy radiated by the sun. Many years of research have led him to the belief that these fluctuations are indirectly reflected in weather changes, and that eventually a reliable method for long-range forecasting may be based on them.

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ASTRONOMY

Winter Begins Tuesday; Sun Farthest South

FOR INHABITANTS of countries north of the tropical regions, winter will begin on Tuesday, December 22, at 2:30 P. M., Eastern Standard Time. At that moment the sun will be at the southernmost part of its annual path. Even though the coldest weather of the winter may come in January, the sun by that time will be well on its northward journey to its spring and summer position.

The reaching of the southernmost point by the sun on the twenty-second is called the winter solstice. Because the sun is then so far south in the sky, it rises in the southeast and sets in the southwest. Even at noon, when highest, it is only 26.5 degrees above the southern horizon, scarcely more than a third the height it occupies at noon at the beginning of summer. Because it thus has a very short path to cross in its motion from sunrise to sunset, it does it in a shorter time than on any other day of the year.

The twenty-second will thus be the shortest day, with the sun above the horizon for only 9 hours and 20 minutes. These figures are for latitude 40 degrees and apply with good accuracy to Philadelphia, Pittsburgh, Columbus, Ohio; Springfield, Ill.; Kansas City, St. Joseph, Mo.; northern Colorado, Salt Lake City, central Nevada and northern California.

Farther south the day is a little longer. For instance, at 35 degrees latitude, near Charleston, S. C.; Dallas and San Diego, the sun rises 14 minutes earlier and sets later by an equal amount, making 28 minutes more of sunlight.

Partly because the sun is now above the horizon for a shorter time than at any other part of the year, but mainly because it shines on the ground at such a low angle that its heat is dissipated over a large area, the earth in the northern hemisphere now receives a relatively small amount of solar radiation. This is the cause of the cold weather.

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ASTROPHYSICS

Moon's Geology Studied By Analysis of Light

STUDYING the minerals on the moon's surface, though no mortal geologist has ever been much nearer to it than a quarter of a million miles, is nevertheless possible, it was explained to visitors at the annual exhibition of the research work done by the Carnegie Institution of Washington.

It is possible to learn something of the nature of the moon's surface by examining the light reflected from it, and comparing it with light reflected from terrestrial rocks and minerals. One line of attack is to make spectral analyses of moonlight, determining the intensities of the various colors of which it is composed. Different types of rock give different proportions of color in their reflection spectra. A second method depends on the fact that moonlight is partly polarized, that is, reflected in such a manner that the light waves vibrate wholly or principally in a single plane. Rocks also differ in the degree to which they polarize the light which they reflect. A third method compares the temperature of the moon's surface when it is illuminated and when it is in eclipse.

By combining these three methods, the Carnegie Institution scientists have eliminated from the moon's surface geology such materials as basalt, granitic rocks and sulphur, leaving as possibilities only pumice, volcanic ash and other rocks of high heat-insulating value. Measurements are now in progress to explore the moon's surface in detail and to identify its surface materials with greater certainty.

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IN SCIENCE

PHYSICS

Cosmic Rays Again Shown Like Radium Gamma Rays

FURTHER SUPPORT of the theory that the mysterious cosmic rays are waves, is offered by Dr. R. A. Millikan and Dr. I. S. Bowen of the California Institute of Technology in a letter to *Nature*.

The long struggle to establish the real nature of these penetrating radiations from outer space has engaged physicists both in America and Germany. Dr. Millikan's faction has favored the theory that the effects are caused by non-material waves like light or radium gamma rays. His critics, led by Dr. Walther Bothe and Dr. Werner Kolhoerster in Germany, believe that the rays are corpuscles, probably electrons.

A doubling of the signal strength was not found by Drs. Millikan and Bowen when the air pressure in the recording electroscope was doubled, contrary to what might be expected. Radium gamma rays, however, they now find, show just this same behavior when they act on the electroscope.

Thus changes of pressure in the electroscope affect the two radiations equally and support Dr. Millikan's idea that the rays are similar in nature. Lack of "saturation" in the currents flowing through the recorders is the cause of the observed absence of proportionality.

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ZOOLOGY

Santa Claus Cavalrymen Bestride Strange Steeds

See Front Cover

CAPTAIN JINKS of the Horse Marines bestrode an unfamiliar steed; but the gentleman in the cover picture mounts one more unfamiliar still. He might qualify as a trooper in the Santa Claus Cavalry, for he is mounted on a reindeer. According to the U. S. Biological Survey, reindeer are used occasionally as saddle and pack animals in Siberia, whence the original stock of the great Alaskan herds was imported; but the animals are seldom used for these purposes on this continent.

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NCE FIELDS

EVOLUTION

Living Diatoms Identical With Ancient Ancestors

EVOLUTION has meant nothing to certain species of diatoms, one-celled plants shown in photomicrographic enlargement at the annual exhibition of research work of the Carnegie Institution of Washington.

Their finely marked fossil shells, left behind when they died over a hundred thousand years ago, are practically identical in every detail with the shells of the same species living today in Chesapeake Bay and other waters of the Atlantic coast. Yet other diatoms have not been immune to the forces that make for evolutionary change. The vast majority of the 8,000 known diatom species have changed greatly; most living species are unrepresented in fossil deposits, and many fossil species have no living kindred. The exhibit of diatoms was arranged by Dr. Albert Mann.

Science News Letter, December 19, 1931

DIETETICS

Milk and Bread First On Depression Menus

MILK and its products; fruit or vegetables or both; and bread and other cheap sources of calories, such as cereals, are the three groups of foods which Dr. Henry C. Sherman of Columbia University declares are essential to save the child-victims of the depression from lasting injury to their health.

The advice of this eminent authority on nutrition was obtained by the American Child Health Association for the guidance of the many mothers faced this winter with the problem of what to feed their children when the family purse is low and the ordinary standards of diet must consequently be sacrificed.

"When shortage of money forces expenditure for food to an abnormally low level, more than one-fifth, perhaps one-third should be spent for milk in some form," Dr. Sherman advised.

One-fifth of the money should go for fruit and vegetables if possible, but the selection should be limited to the cheaper sorts so as to get the most food value for the money.

At least one-fifth of the reduced expenditure may well go for breadstuffs and cheap forms of cereal, since a penny spent here will go farthest to meet the actual pangs of hunger.

The remainder may be divided one-fifth for meats, fish, eggs, and one-fifth for fats, sugar and other groceries, but these foods can be omitted altogether if one gets enough milk in some form and of fruits and vegetables to provide the absolutely essential minerals and vitamins, and enough breadstuff to prevent actual weakness from hunger.

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EVOLUTION

Individual's Life Affected By Darwinian Evolution

DARWINIAN evolution was extended to apply to the movements and reactions of individual animals and plants by Dr. Edwin G. Conklin, Princeton biologist, addressing the Washington Academy of Sciences.

In nature, he explained, there is a great overproduction of movements and reactions. Adaptations occur by the elimination of unfit reactions during the life of the individual that do not cause its death but do modify its course of life. Immunities to certain diseases acquired during life were cited as examples by Dr. Conklin.

Darwin's famous principle of the elimination of the unfit is thus applied to reactions of animals and plants as well as the existence of whole kinds and species of living things.

All fitness for life displayed by the living world can be explained mechanistically, Dr. Conklin contended, if to begin with life is endowed with sensitivity to distinguish between good and evil situations, reproduction to perpetuate the organism, and metabolism to convert non-living materials to the use of the living thing. Biologists generally recognize these three fundamentals of life.

"Something other than mere chance and accident permeates the entire universe," Dr. Conklin said in protesting against undiluted mechanistic evolution.

With "vitalism" or "psychism" that "no one can define or study I have no sympathy," Dr. Conklin explained. But he contended that something which may be called "differential sensitivity psychism" is necessary after which all of evolution can be explained on the basis of the operation of mechanistic principles.

Science News Letter, December 19, 1931

BIOGRAPHY

Noted Editor To Head Southwest Museum

ANNOUNCEMENT that the Southwest Museum is to have as its director Frederick W. Hodge, well known ethnologist and editor of many important scientific publications, has been made by M. R. Harrington, curator of the Museum, at Los Angeles. Mr. Hodge's appointment will take effect January first, Mr. Harrington stated.

Among scientists Mr. Hodge is best known as editor of the "Handbook of American Indians," a monumental two-volume work, arranged in encyclopedia form and giving facts about Indian tribes north of Mexico. Material for these two bulky volumes was gathered and published by the Bureau of American Ethnology, more than twenty years ago. It is still one of the outstanding reference works on the Indians.

Mr. Hodge has conducted a number of expeditions to the Southwest. In 1897, he successfully scaled the precipitous "Enchanted Mesa." His latest excavations have been at the pueblo of Hawikuh, in New Mexico, where the Hendricks-Hodge Expedition worked for six seasons, finding evidence that Indians of different periods had occupied the old town.

For nineteen years, Mr. Hodge acted as editor of the *American Anthropologist,* and in 1916 he was honored by being made President of the American Anthropological Association.

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ENGINEERING

Vertical Recording Used With New Disc Records

THE KIND of phonograph recording used by Edison in his original work promises to return to practical use and effect the most faithful reproductions of music. Halsey A. Frederick of the Bell Telephone Laboratories demonstrated to the Society of Motion Picture Engineers and the Institute of Radio Engineers new disc records cut by the vertical method instead of the lateral method used in ordinary phonographs. The new system of music reproduction is claimed to eliminate needle scratch. The material of the new disc records is cellulose acetate, the same substance that is used in making cellophane, rayon and other new products of synthetic chemistry.

Science News Letter, December 19, 1931

BIOLOGY

The Beagle Starts Her Voyage

"A Classic of Science"

Darwin's First Letter Home From the Voyage Which Laid The Foundation For the Momentous Theory of Evolution

THE LIFE AND LETTERS OF CHARLES DARWIN, Edited by his son, Francis Darwin. 2 vol. New York, Appleton, 1887.

C. Darwin to R. W. Darwin

Bahia, or San Salvador, Brazils,
[February 8, 1832].

I find after the first page I have been writing to my sisters.

MY DEAR FATHER,

I AM WRITING this on the 8th of February, one day's sail past St. Jago (Cape de Verd), and intend taking the chance of meeting with a homeward-bound vessel somewhere about the equator. The date, however, will tell this whenever the opportunity occurs. I will now begin from the day of leaving England, and give a short account of our progress. We sailed, as you know, on the 27th of December, and have been fortunate enough to have had from that time to the present a fair and moderate breeze. It afterwards proved that we had escaped a heavy gale in the Channel, another at Madeira, and another on [the] Coast of Africa. But in escaping the gale, we felt its consequences—a heavy sea. In the Bay of Biscay there was a long and continuous swell, and the misery I endured from sea-sickness is far beyond what I ever guessed at. I believe you are curious about it. I will give you all my dear-bought experience. Nobody who has only been to sea for twenty-four hours has a right to say that sea-sickness is even uncomfortable. The real misery only begins when you are so exhausted that a little exertion makes a feeling of faintness come on. I found nothing but lying in my hammock did me any good. I must especially except your receipt of raisins, which is the only food that the stomach will bear. . .

We were becalmed for a day between Teneriffe and the Grand Canary, and here I first experienced any enjoyment. The view was glorious. The Peak of Teneriffe was seen amongst the clouds like another world. Our only drawback was the extreme wish of visiting this glorious island. *Tell Eyton never to forget either the Canary Islands or South America;* that I am sure it will well repay the necessary trouble, but that he must make up his mind to find a good deal of the latter. I feel certain he will regret it if he does not make the attempt. From Teneriffe to St. Jago the voyage was extremely pleasant. I had a net astern the vessel which caught great numbers of curious animals, and fully occupied my time in my cabin, and on deck the weather was so delightful and clear, that the sky and water together made a picture. On the 16th we arrived at Port Praya, the capital of the Cape de Verds, and there we remained twenty-three days, viz., till yesterday, the 7th of February. The time has flown away most delightfully, indeed nothing can be pleasanter; exceedingly busy, and that business both a duty and a great delight. I do not believe I have spent one-half hour idly since leaving Teneriffe. St. Jago has afforded me an exceedingly rich harvest in several branches of Natural History. I find the descriptions scarcely worth anything of many of the commoner animals that inhabit the Tropics. I allude, of course, to those of the lower classes.

Geologising . . .

Geologising in a volcanic country is most delightful; besides the interest attached to itself, it leads you into most beautiful and retired spots. Nobody but a person fond of Natural History can imagine the pleasure of strolling under cocoa-nuts in a thicket of bananas and coffee-plants, and an endless number of wild flowers. And this island, that has given me so much instruction and delight, is reckoned the most uninteresting place that we perhaps shall touch at during our voyage. It certainly is generally very barren, but the valleys are more exquisitely beautiful, from the very contrast. It is utterly useless to say anything about the scenery; it would be as profitable to explain to a blind man colours, as to a person who has not been out of Europe, the total dissimilarity of a tropical view. Whenever I enjoy anything, I always either look forward to writing it down, either in my log-book (which increases in bulk), or in a letter; so you must excuse raptures, and those raptures badly expressed. I find my collections are increasing wonderfully, and from Rio I think I shall be obliged to send a cargo home.

Sufferings of Sea-sickness . . .

All the endless delays which we experienced at Plymouth have been most fortunate, as I verily believe no person ever went out better provided for collecting and observing in the different branches of Natural History. In a multitude of counsellors I certainly found good. I find to my great surprise that a ship is singularly comfortable for all sorts of work. Everything is so close at hand, and being cramped makes one so methodical, that in the end I have been a gainer. I already have got to look at going to sea as a regular quiet place, like going back home after staying away from it. In short, I find a ship a very comfortable house, with everything you want, and if it was not for sea-sickness the whole world would be sailors. I do not think there is much danger of Erasmus setting the example, but in case there should be, he may rely upon it if he does not know one-tenth of the sufferings of sea-sickness.

I like the officers much more than I did at first, especially Wickham, and young King and Stokes, and indeed all of them. The Captain continues steadily very kind, and does everything in his power to assist me. We see very little of each other when in harbour, our pursuits lead us in such different tracks. I never in my life met with a man who could endure nearly so great a share of fatigue. He works incessantly, and when apparently not employed, he is thinking. If he does not kill himself, he will during this voyage do a wonderful quantity of work. I find I am very well, and stand the little heat we have had as yet as well as anybody. We shall soon have it in real earnest. We are now sailing for Fernando Noronha, off the coast of Brazil, where we shall not stay very long, and then examine the shoals be-

ween there and Rio, touching perhaps at Bahia. I will finish this letter when an opportunity of sending it occurs.

February 26th.—About 280 miles from Bahia. On the 10th we spoke the packet *Lyra,* on her voyage to Rio. I sent a short letter by her, to be sent to England on [the] first opportunity. We have been singularly unlucky in not meeting with any homeward-bound vessels, but I suppose [at] Bahia we certainly shall be able to write to England. Since writing the first part of [this] letter nothing has occurred except crossing the Equator, and being shaved. This most disagreeable operation consists in having your face rubbed with paint and tar, which forms a lather for a saw which represents the razor, and then being half drowned in a sail filled with salt water. About 50 miles north of the line we touched at the rocks of St. Paul; this little speck (about ¼ of a mile across) in the Atlantic has seldom been visited. It is totally barren, but is covered by hosts of birds; they were so unused to men that we found we could kill plenty with stones and sticks. After remaining some hours on the island, we returned on board with the boat loaded with our prey. From this we went to Fernando Noronha, a small island where the [Brazilians] send their exiles. The landing there was attended with so much difficulty owing [to] a heavy surf that the Captain determined to sail the next day after arriving. My one day on shore was exceedingly interesting, the whole island is one single wood so matted together by creepers that it is very difficult to move out of the beaten path. I find the Natural History of all these unfrequented spots most exceedingly interesting, especially the geology. I have written this much in order to save time at Bahia.

A Graceful Lightness . . .

Decidedly the most striking thing in the Tropics is the novelty of the vegetable forms. Cocoa-nuts could well be imagined from drawings, if you add to them a graceful lightness which no European tree partakes of. Bananas and plantains are exactly the same as those in hothouses, the acacias or tamarinds are striking from the blueness of their foliage; but of the glorious orange trees, no description, no drawings, will give any just idea; instead of the sickly green of our oranges, the native ones exceed the Portugal laurel in the darkness of their tint, and infinitely exceed it in beauty of form. Cocoa-nuts, pawaws, the light green bananas, and oranges, loaded with fruit, generally surround the more luxuriant villages. Whilst viewing such scenes, one feels the impossibility that any description should come near the mark, much less be overdrawn.

San Salvador . . .

March 1st.—Bahia, or San Salvador. I arrived at this place on the 28th of February, and am now writing this letter after having in real earnest strolled in the forests of the new world. No person could imagine anything so beautiful as the ancient town of Bahia, it is fairly embosomed in a luxuriant wood of beautiful trees, and situated on a steep bank, and overlooks the calm waters of the great bay of All Saints. The houses are white and lofty, and, from the windows being narrow and long, have a very light and elegant appearance. Convents, porticos, and public buildings, vary the uniformity of the houses; the bay is scattered over with large ships; in short, and what can be said more, it is one of the finest views in the Brazils. But the exquisite glorious pleasure of walking amongst such flowers, and such trees, cannot be comprehended but by those who have experienced it. Although in so low a latitude the locality is not disagreeably hot, but at present it is very damp, for it is the rainy season. I find the climate as yet agrees admirably with me; it makes me long to live quietly for some time in such a country. If you really want to have [an idea] of tropical countries, study Humboldt. Skip the scientific parts, and commence after leaving Teneriffe. My feelings amount to admiration the more I read him. Tell Eyton (I find I am writing to my sisters!) how exceedingly I enjoy America, and that I am sure it will be a great pity if he does not make a start.

This letter will go on the 5th, and I am afraid will be some time before it reaches you; it must be a warning how in other parts of the world you may be a long time without hearing. A year might by accident thus pass. About the 12th we start for Rio, but we remain some time on the way in sounding the Albrolhos shoals. Tell Eyton as far as my experience goes let him study Spanish, French, drawing, and Humboldt. I do sincerely hope to hear of (if not to see him) in South America. I look forward to the letters in Rio—till each one is acknowledged, mention its date in the next.

We have beat all the ships in manoeuvring, so much so that the commanding officer says, we need not follow his example; because we do everything better than his great ship. I begin to take great interest in naval points, more especially now, as I find they all say we are the No. 1 in South America. I suppose the Captain is a most excellent officer. It was quite glorious today how we beat the *Samarang* in furling sails. It is quite a new thing for a "sounding ship" to beat a regular man-of-war; and yet the *Beagle* is not at all a particular ship. Erasmus will clearly perceive it when he hears that in the night I have actually sat down in the sacred precincts of the quarter deck. You must excuse these queer letters, and recollect they are generally written in the evening after my day's work. I take more pains over my logbook, so that eventually you will have a good account of all the places I visit. Hitherto the voyage has answered *admirably* to me, and yet I am now more fully aware of your wisdom in throwing cold water on the whole scheme; the chances are so numerous of turning out quite the reverse; to such an extent do I feel this, that if my advice was asked by any person on a similar occasion, I should be very cautious in encouraging him. I have not time to write to anybody else, so send to Maer to let them know, that in the midst of the glorious tropical scenery, I do not forget how instrumental they were in placing me there. I will not rapturise again, but I give myself great credit in not being crazy out of pure delight.

Give my love to every soul at home, and to the Owens.

I think one's affections, like other

CHARLES DARWIN

Aged 7, with his sister Catherine, aged 6. He had also three older sisters and an older brother.

good things, flourish and increase in these tropical regions.

The conviction that I am walking in the New World is even yet marvellous in my own eyes, and I dare say it is little less so to you, the receiving a letter from a son of yours in such a quarter.

Believe me, my dear Father,
Your most affectionate son,
CHARLES DARWIN.

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ENGINEERING

Wear on Tires Measured By Use of Depth Gages

RESEARCH to determine the amount of rubber eaten from automobile tires by hungry highway surfaces during carefully controlled test runs was reported to the Highway Research Board of the National Research Council meeting at Washington by A. A. Anderson and H. B. Wright, highway engineers of Chicago.

Sensitive gages used to measure the decreasing depth of the tire tread proved to be the most accurate means of checking wear. The tires were also weighed at the end of every thousand miles, but this method of determining the loss of rubber proved ineffective because the tire weight varies with weather conditions such as temperature and humidity. The engineers found that data on front wheel tires varied so much that the figures were worthless while readings on the rear wheels remained uniform.

From runs of more than 3,000 miles on non-skid asphaltic concrete and on Portland cement concrete it was found that the tires wore less on Portland cement than on the asphaltic pavement, the report stated. To get uniform wear Mr. Wright and Mr. Anderson increased tire pressure four pounds per square inch above the recommendation of the Tire and Rim Association.

Other conclusions show that increase in temperature from early morning to noon may be enough to swell balloon tires and make a car that ran smoothly at eight o'clock bounce uncomfortably at twelve.

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American chestnut trees, which have been so widely destroyed by fungus blight, appear to be developing resistance, since new shoots from roots of trees killed by the fungus are growing rapidly and even producing fair-sized crops of chestnuts.

GENERAL SCIENCE

Depression Does Not Justify Research Work Moratorium

THE SAFETY of humanity does not require a moratorium on increase of honest knowledge, Dr. John C. Merriam, president of the Carnegie Institution of Washington, has declared in his annual report, which summarized the accomplishments of hundreds of scientists working under the sponsorship of this far-flung research organization.

While admitting that half truths and unorganized or unrelated facts constitute a real source of danger, Dr. Merriam said that "what we need is more truth and the acceptance of knowledge for precisely what it is."

Scientific research can aid in the present emergency of a depression, Dr. Merriam contended, by continued seeking for new truths. Dr. Merriam recalled the service of science to the World War.

"In each period of emergency there has been intensive study of the place and function of research with reference to needs of the special situation," Dr. Merriam said. "There has been vigorous search for new materials with which to meet the requirements. But in spite of earnest endeavor, it has rarely been possible to secure aid through new research. The major achievements have been reached commonly by inventive use of existing materials through recombinations. These situations, however, exert large influence in stimulation of research. They serve to show that, with a considerable spread of years between the inception of a new and fundamental idea and its human application, there must be continuous study of those more clearly basic things upon which future science and its application will rest."

That heterogeneous, unorganized new ideas may be dangerous to society, Dr. Merriam admitted, in recalling that some have feared that new knowledge will confuse or that in some way research is responsible for maladjustment in the rapid development of heavily mechanized modern life. Newly discovered types of physical energy applied inexpertly in medical practice or unwise economic promotion in connection with introduction of new mechanical devices may be dangerous. Harm can be done through unwarranted philosophical or religious application of incomplete scientific hypotheses.

But, said Dr. Merriam, the evils which develop are not necessarily to be charged against the new knowledge as such. Generally they are compounded from inadequacy of knowledge or failure to recognize the need of additional correlated information. Human frailty taking the form of selfishness in use of new materials is a menace coordinate in significance with the dangers of ignorance and bad judgment.

"As we see close at hand the end of man's age-long struggle with the wilderness of nature through which he has come," Dr. Merriam said, "it is important to realize that life in those jungles which arise by human construction requires not less, but more, of the type of ability that has characterized human progress to the present stage."

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ARCHAEOLOGY

Drawing Shows Man Rode Horse 5000 Years Ago

MEN rode horses in the land that is now Persia more than 5,000 years ago, according to archaeological evidence recently unearthed at Susa, capital of ancient Elam and perhaps the oldest city on earth.

NAPOLEON'S FOREBEAR

The world's oldest known picture of a man on horseback.

The evidence consists of two sketchy outline drawings of men mounted on horses scratched into bone implements found deep beneath the ruins of Susa, below a stratum of culture remains that have been dated with some confidence as of about 3100 B. C., and therefore older than this layer. The implements were described by Pére V. Scheil, of Paris, in the *Revue d'Assyriologie.*

Commenting on these crude little sketches, the editor of the English archaeological journal *Antiquity,* remarks: "The great cultural importance of this discovery will at once be apparent; it is the earliest evidence of the domestication of the horse."

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ACOUSTICS

Standing Audience Improves Building Acoustics One-Fourth

IF THEATER audiences would stand instead of keeping their seats they would probably be able to hear much better than they do now because the very act of standing often improves the acoustics of an auditorium. This fact was demonstrated recently in a concert given by the Philadelphia Symphony Orchestra, Sidney K. Wolf, an engineer of New York City, said in a recent lecture at Yale University.

Prior to the concert the auditorium was tested for its acoustical efficiency. During the intermission the audience was asked to stand and again the auditorium was tested. It was found, according to Mr. Wolf, that the acoustic efficiency had improved 25 per cent.

A new type of auditorium has been devised, Mr. Wolf stated, to give the same audibility at the back of the hall and in higher balconies as is obtained in the first few rows.

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MEDICINE

New Anesthetic Found in Accordance With Prediction

A NEW general anesthetic for use in surgical operations, which is more rapid and efficient than ether, chloroform or the anesthetic gases, has been discovered in accordance with a prediction of Dr. C. D. Leake, professor of pharmacology at the University of California Medical School, Dean Langley Porter has announced.

The new anesthetic is called divinyl oxide. It is chemically related to ether and ethylene and will probably be given in the same way that ether is. However, it is superior in several ways.

Recovery is more rapid when divinyl oxide is used for an operation than when ether is used. There is less excitement and less nausea with the new anesthetic. There is also less irritation of the lungs and less disturbance of the body's chemical equilibrium. The heart action is not greatly changed.

Divinyl oxide is a liquid which boils at a low temperature. It is inflammable and as explosive as ether.

Associated with Dr. Leake in the work leading to this discovery were Mrs. Mei-Yu Chen Mai, now in Peiping, China; Dr. P. K. Knoefel, Fellow of the National Research Council; and Dr. A. E. Guedel, Los Angeles anesthetist.

While investigating the anesthetic action of ether and ethylene at the University of Wisconsin, Dr. Leake predicted that divinyl oxide, chemical relative of these substances, would prove valuable.

At his request, it was produced in a chemically pure form by Dr. R. T. Major and Dr. W. L. Ruigh of Princeton University and the Merck Laboratory for Pure Research at Rahway, N. J. It was then given a trial and as a result the world has a new anesthetic.

Clinical evaluation of the new anesthetic is still proceeding at the University of California Hospital under the supervision of Dr. H. C. Naffziger, professor of surgery, and Dr. D. Wood.

The experiments leading to this discovery were made possible by financial aid from public-spirited citizens, chiefly the Christine Breon Research Fund, Dean Porter said.

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METEOROLOGY

Radio Waves Not Guilty Of Upsetting Weather

RADIO does not cause droughts or affect the weather in any other way, the U. S. Weather Bureau has determined. Many appeals have come to the Weather Bureau to have radio broadcasting suppressed on the ground that it burns up the water vapor of the air or otherwise decreases rainfall.

"However much radio may be affected by the weather, especially by the thunderstorm, no element of the weather is affected in turn by radio," said Dr. W. J. Humphreys, U. S. Weather Bureau meteorological physicist, in an official summary. "We know this from experiment and observation, and we know it from theory as well," he declared.

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HYGIENE

Helmets May Replace Caps For Sailors in Tropics

THE TRADITIONAL wide trousers and sailor collars of the enlisted man in the U. S. Navy may be abandoned in one branch of the service and the "gob" on duty in tropical waters may have a helmet to wear instead of the usual diminutive white cap.

Some such change is recommended as a health measure by Surgeon General Charles E. Riggs in his annual report to the Secretary of the Navy.

The jaunty cap of the sailor cannot be depended upon to protect him from the rays of the tropical sun, Surgeon General Riggs pointed out. The officer's cap is similarly criticized although to a less extent because of the visor and of a reduction in exposure time.

"The remedy recommended, not as a substitution but an addition, is the ventilated helmet," the report said.

The large collar and wide trouser-bottom of the regular uniform are thought by some to constitute an unnecessary extra hazard in ground service in aviation. The question of suitable clothing thus becomes a special problem for that branch of the service, in the opinion of the Surgeon General.

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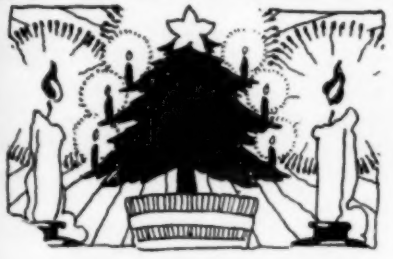
BOTANY

Nature Ramblings

By FRANK THONE



Christmas Trees

CHRISTMAS trees, like many of the other things wherewith we deck our houses at the Yule season, are older than Christmas itself, and were first used in lands far remote from Bethlehem. They belong to the North, to the lands beyond the Rhine and the Danube. When the Church conquered Odin his tree was permitted to stand, but as trophy to the Child in whose name he was forced into banishment and final oblivion. So behind the gayety of the Christmas tree, as the dark leaves of the fir or spruce or pine stand behind the gayety of the tinsel and the candles, stands the sober and solid fact of the march of the creed that made Christendom. We tend to forget that Christmas is primarily a religious festival, but reminders of it lurk at every turn, to take us unawares.

A careful and worried conservationism, a generation or so ago, used to warn us to shun all use of Christmas trees, because our forests were vanishing, and these little trees were needed to replace the timber. Such a materialistic pang need not detract from our Christmas celebration now, the U. S. Forest Service declares. Unless the Christmas tree marketer strips an area quite clean of little trees, he is doing the forest a service rather than an injury, because only a fraction of the saplings in a given stand can grow anyway, and the rest are doomed to death by crowding. In a well-managed forest, such as any of the national or state forests, the proper officials indicate what trees may be cut and what must be left standing, and these thinnings are the trees that find their way to the Christmas market. Their sale not only adds to the gayety of the season but, at the other end, helps to pay the wages of the foresters.

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ASTRONOMY

Milky Way May Actually Be Only Average-Sized Nebula

THE DISTINCTION of living in the midst of the largest aggregation of stars in the universe was probably snatched from earth dwellers by Dr. Frederick H. Seares, assistant director of the Mount Wilson Observatory, when he reported to the Carnegie Institution of Washington that clouds of dust and gas in our galaxy dim the light of the star clusters and thus astronomers were misled in thinking that they were farther away than they really are.

Instead of the stellar system in which our sun is a minor star being some five times the size of the largest spiral nebulae in the heavens, Dr. Seares believes that a correction for the absorption of light by interstellar gas and dust clouds will narrow down this difference, perhaps even showing that the galaxy around us is quite ordinary in size.

The portion of the universe in which the earth and mankind happen to be located loses again a claim to distinction among the millions of other galaxies or "island universes" that telescopes reveal as dotting the heavens in all directions.

Present estimates that it takes light 200,000 years to travel across the diameter of our stellar system depend upon determinations of the distances of the globular star clusters, Dr. Seares explained. In these clusters of stars there are stars whose light waxes and wanes in regular periods. Some years ago it was discovered that the time of these stellar light variations was the key to the true brightness of the variable star. By comparing the real brightness and the luminosity of the star as it appears from earth, the astronomers were able to find its distance.

By obscuring the light from these distant stars used as measuring sticks, Dr. Seares is fearful that the clouds of nebulosity in the plane of the Milky Way have so shortened the standard of length that it has given too high values.

Aside from its supposed larger size, the galaxy around us is so typical of the spirals that, Dr. Seares explained, "study of the spirals helps us to understand the galaxy." If we could look at the Milky Way and the rest of our galaxy from a point a million light years out in space it would look something like the great nebula in Andromeda or the famous Messier 33 nebula. It would have a great watch-shaped contour, stars scattered within, and great stellar aggregations, luminous nebulae and dark obscuring clouds located in the central plane of the galaxy.

Proof of Dr. Seares' inference that obscuring clouds are widespread over the central plane of the galaxy was aided by photographs made at the Mount Wilson Observatory by Dr. F. E. Ross of Yerkes Observatory.

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• First Glances at New Books

Archaeology

THE PAGEANT OF CIVILIZATION—Arthur G. Brodeur—*McBride,* 537 p., $6. Dr. Brodeur is a professor of English, writing about his hobby, archaeology. It is his aim "to bring before the reader, one after the other, the great civilizations of the world." This he does with a nice literary swing. His favorite method, which he uses effectively, is to take the relics unearthed by archaeologists and to reconstruct from them scenes and events in the life of ancient peoples. The civilizations described are those of Egypt, Babylonia, Crete, Assyria and Chaldea, Greece, India and Rome.

Science News Letter, December 19, 1931

General Science

THE ADVANCEMENT OF SCIENCE, 1931—*British Association for the Advancement of Science,* 5 s. Year after year the books bringing together addresses given before the meetings of the British Association for the Advancement of Science have provided a cross-section of current thought in science. This year's volume collecting the presidential addresses at the centenary meeting in London continues this helpful tradition.

Science News Letter, December 19, 1931

Philosophy

THE UNIVERSE WITHIN US—R. O. P. Taylor—*Richard R. Smith,* 168 p., $2. An English churchman who has found time to become a scholar takes up anew (as it must be taken up anew each generation) the old problem of mapping God's place in the universe. The book is a distinct contribution to present-day "reconciliation" literature.

Science News Letter, December 19, 1931

Aviation

MAN'S WINGS—HOW TO FLY—J. M. Richardson and John McCormick—*Reilly and Lee,* 107 p., $1. The science and technique of flying prepared for juvenile audiences in pictures and drawings with short informative captions.

Science News Letter, December 19, 1931

Astronomy

SIGNALS FROM THE STARS—George Ellery Hale—*Scribners,* 138 p., $2. To George Ellery Hale the world of astronomy owes much, for his inspiration and guidance of both astronomers and observatories. In this volume, worthy successor of his other small books, "Beyond the Milky Way," "The Depths of the Universe" and "The New Heavens," Dr. Hale discusses the possibilities of large telescopes, explores the solar atmosphere, interprets signals from the sun and describes the building of the new 200-inch telescope which is now in progress.

Science News Letter, December 19, 1931

Nature Study

HOLIDAY HILL—Edith M. Patch—*Macmillan,* 135 p., $2. The author of "Holiday Pond" and "Holiday Meadow" adds another to her series of charming books for children. Like its predecessors, "Holiday Hill" is written with a real understanding both of its subjects, the birds and beasts and flowers, and of its objects, the minds of children. And in refreshing contrast with many "nature" writings for children, there is no distortion of fact: a rabbit is not a Fabulous Monster wearing a two-button waistcoat and talking English to an owl; he is just a rabbit, and his rabbit ways are sufficiently interesting in themselves to need no "pepping up" with unnatural sugar-pap.

Science News Letter, December 19, 1931

Ornithology

NESTS AND EGGS OF OUR COMMON BIRDS—Howard Jones—*Lezius Hiles Co., Cleveland,* 44 p., $1. A handy, pocket-size booklet giving compact identification keys for nests and eggs in tabular form, with space for making field notes.

Science News Letter, December 19, 1931

Psychology

INTEGRATIVE PSYCHOLOGY—William M. Marston, C. Daly King, and Elizabeth H. Marston—*Harcourt, Brace,* 558 p., $7. Written in response to the complaint of freshmen that they must go to their final examinations with no unified idea of what psychology actually is. The author believes that the experimental findings of physiology and neurology should be adopted by psychology, but that entirely new interpretations should be made. Such new interpretations and theoretical implications are presented in this volume.

Science News Letter, December 19, 1931

Biology

BIOLOGY AND MANKIND—S. A. McDowall—*Macmillan,* 229 p., $2.50. A compact and well arranged elementary text by an English science teacher.

Science News Letter, December 19, 1931

Nature Study

CHILD AND UNIVERSE—Bertha Stevens—*John Day,* 249 p., 48 pl., $3.75. The author of this book, designed for those—whether parents or teachers—who have the training of children in their hands, is heedful of the ancient admonition to get knowledge, and withal to get understanding. For with the well-chosen content go many valuable suggestions on method of presentation which show a good insight into children's minds, and with it all a fine sense of the esthetic values to be found in natural objects. The illustrations are chosen from the collections of the best nature photographers in this country and Germany. This book should make a very welcome holiday gift in any home where an effort is being made to bring up children intelligently.

Science News Letter, December 19, 1931

Botany

TREES AND SHRUBS OF MINNESOTA—C. O. Rosendahl and F. K. Butters—*University of Minnesota Press,* 385 p., $4. This book, written by two well-known botanists, has value for workers far outside the boundaries of Minnesota. Among the gratifyingly increasing list of State floras and tree books, it is easily one of the best.

Science News Letter, December 19, 1931

Ornithology

PARADISE QUEST—Lee S. Crandall—*Scribner,* 226 p., $3.50. The author, an ornithologist, set out for New Guinea in quest of "the glorious birds of paradise which inhabit its tangled jungles." Perhaps it is giving the plot away to say that he returned to America in triumph with forty living birds of paradise and two hundred other tropical birds. But before the final scene there were many adventures with natives and birds and beasts of the tropics.

Science News Letter, December 19, 1931

General Science

RESEARCH LABORATORY RECORD—*Nelson Publishing Co.,* $5 a year, 50c a month. A new magazine devoted to telling of activities of the nation's research laboratories makes its bow with the November issue, which is largely devoted to the story of the recent tour of research laboratories sponsored by the Division of Engineering and Industrial Research of the National Research Council.

Science News Letter, December 19, 1931